



ASTHMA

QUICK FACTS

In most cases, we don't know what causes asthma, and we don't know how to cure it; but we do know what contributes to asthma attacks and how to prevent them.¹

The environment, especially indoor and outdoor air pollution, plays a role in asthma symptoms and may even lead to the onset of the disease.²⁻⁵

Asthma prevention and control is focused on avoidance of environmental triggers and on following a tailored medical management plan.⁶

Asthma affects more than 25.9 million people in the United States. More than one third of those affected are children under the age of 18 years.⁶ Nationally, it is among the leading causes of hospitalizations for children. In 2006, the average charge for an asthma-related hospital stay for a child was more than \$9,000. For 2007, the incremental cost of asthma to society was \$56 billion.⁷

WHAT IS ASTHMA?

Asthma is a chronic inflammatory disease of the airways that causes shortness of breath, wheezing, coughing, and tightness in the chest. For some people, asthma symptoms, or attacks, are intermittent and only appear when they are exposed to irritants such as indoor or outdoor air pollutants. Others have persistent asthma which makes breathing difficult all of the time.



Asthma Prevalence by Sex, Race and Ethnicity^{8,9}

Although asthma can be controlled, it continues to affect an increasing percentage of the population across all ages and races. The occurrence of asthma symptoms has been linked to exercise, respiratory infections, and exposure to environmental factors such as allergens, tobacco smoke, and indoor and outdoor air pollution. Understanding the link between our environment and asthma has been crucial to uncovering ways to control the disease and its triggers. Through continued research and tracking we are learning more about the disease, effective treatments, and its potential causes.

WHAT CAUSES ASTHMA?

For most people, we do not know what caused their asthma. We do have a good understanding of the changes in lung function associated with the disease as well as the environmental factors linked with asthma attacks. There is currently no known cure for asthma, but there are ways to control it.

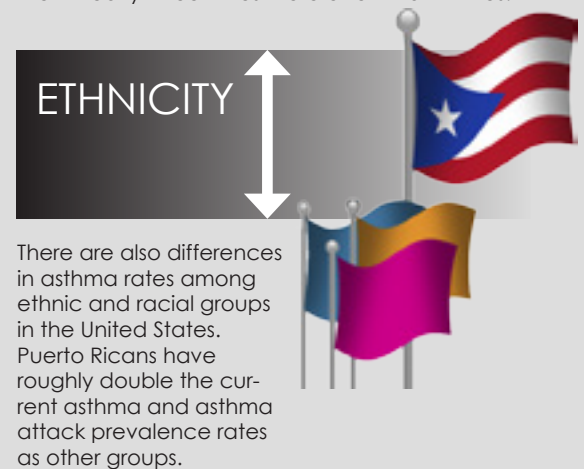
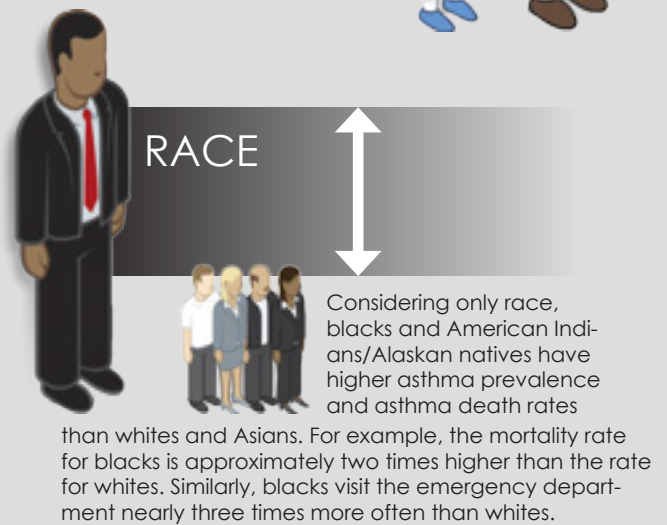
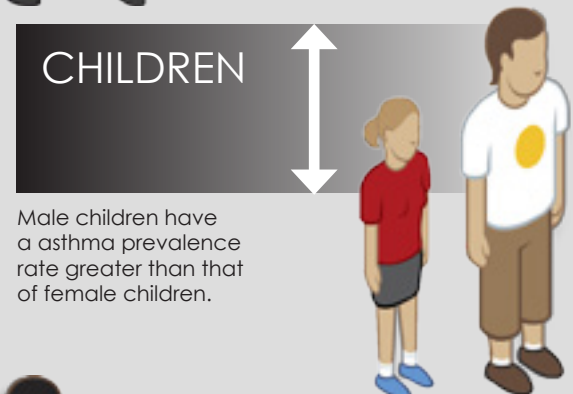
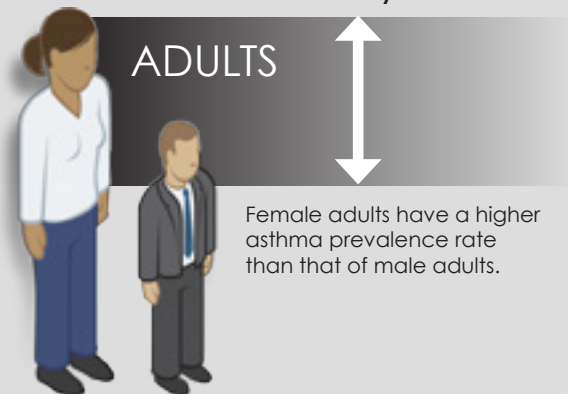
Environmental triggers such as allergens (pet dander, dust mites, etc.), second-hand tobacco smoke, and air pollution have been linked with the occurrence of asthma attacks. Researchers believe that some of these factors may also lead to the initial development of the disease.² But until the primary causes of asthma are found, prevention efforts are limited to controlling symptoms through medical treatment and management of environmental triggers.

WHAT ARE THE RISK FACTORS FOR ASTHMA?

A number of risk factors have been linked with asthma, but the following are key factors associated with the onset and severity of the disease:

INDOOR AND OUTDOOR AIR

Indoor air plays a large role in both susceptibility to asthma and the risk of attacks. Common household allergens and irritants, such as dust mites, mold, cockroach allergen, and tobacco smoke, have been shown to increase the risk for children developing asthma and are known causes for attacks in asthma sufferers. Dander from dogs and cats can also contribute to asthma attacks.²



Outdoor air pollutants, such as particulate matter and ozone, have also been linked with asthma symptoms and may contribute to the occurrence of asthma.^{3,4,5} See the Outdoor Air Quality chapter for more information about particulate matter and ozone.

RESPIRATORY INFECTIONS

There seems to be an association with viral respiratory infections early in life and the development of asthma.^{2,10} However, experience of some of these infections early in childhood may actually help to develop an immune system that is less likely to exhibit an allergic response and protect the child from developing asthma in the future.^{11,12} For people who do develop asthma, later respiratory infections make them more susceptible to environmental triggers and asthma attacks.

OTHER RISK FACTORS

Other factors such as personal or maternal cigarette smoking and obesity have also been linked with increased risk and severity of asthma.¹³⁻¹⁶ For some asthma sufferers, cold air and strong odors may be triggers.

HOW ARE WE TRACKING ASTHMA?

Asthma is not a reportable disease nor is there a single laboratory test to diagnose it, making it a challenge to determine the true impact of the disease on the population. Therefore, it is difficult to estimate the number of new cases emerging each year and to understand and identify factors that cause development of the disease.

Currently, most of our asthma surveillance data consists of prevalence estimates derived from surveys of self-reported symptoms, estimates from medical encounters of people receiving care for asthma, and from death certificates. Each of these surveillance measures has been tracked for a fairly long historical period and gives us a snapshot of different aspects of the burden of asthma. These data are useful in providing estimates about the geographic distribution and burden of asthma among different segments of our population, which can be used to plan and evaluate asthma interventions. However, changes over time in survey questions and coding of asthma cases make it difficult to compare data over extended periods of time for the purposes of assessing asthma trends.



Asthma Attack Prevalence, 2008-2010

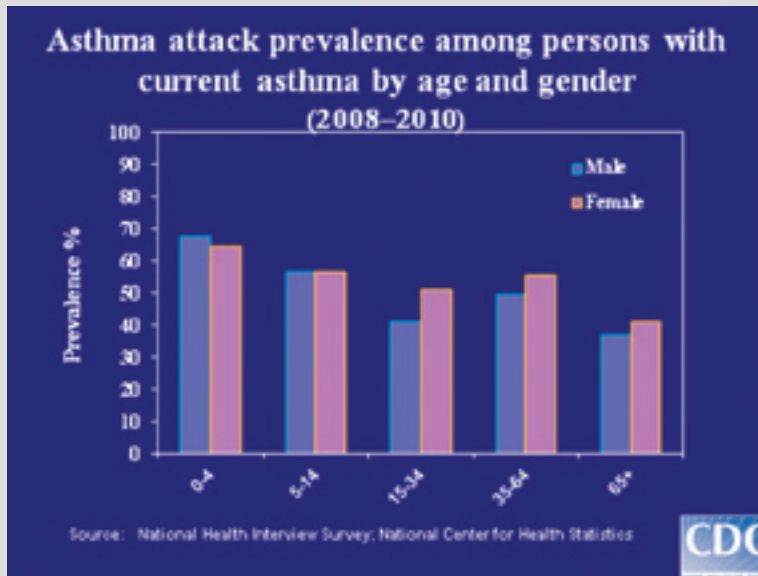


Figure 3. The percentage of persons with asthma who reported having at least one asthma attack in the previous 12 months, by age group and gender.²⁰

Asthma Hospital Discharges



Figure 4. Number and rate of asthma (as first-listed diagnosis) hospital discharges, by year, in the United States, 1980-2009. Rates are age-adjusted to the 2000 U.S. population.²⁰⁻²⁴

Asthma Mortality Rates by Race

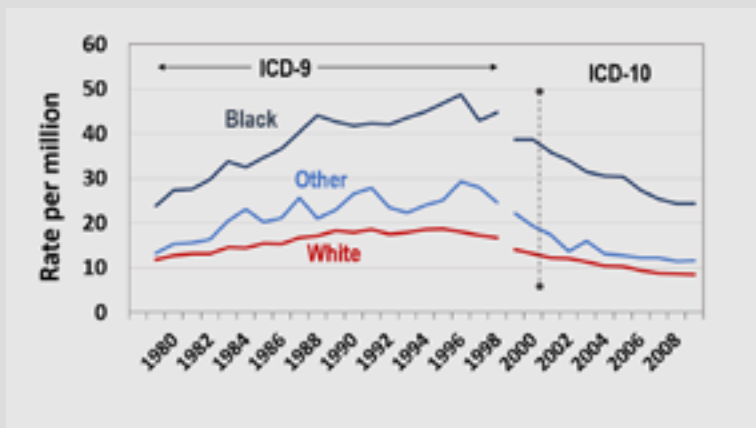


Figure 5. Age-adjusted death rates in the United States, 1979-2009. The vertical line indicates when the criteria used to identify asthma-related deaths changed.^{20,21}

The number and rate of asthma hospital discharges have been fairly stable for the period from 1980–2007 (Figure 4).^{20–24} In 2009, hospitalization rates were highest among very young children (0 to 4 years of age), with 41 hospitalizations per 10,000 children. A different picture emerges from mortality data as few young children die from asthma.

Currently, there are fewer than 3,500 asthma deaths per year. Asthma mortality increased between 1980 and the late 1990s; however, since 2000 there has been a decline in asthma deaths.^{20,21} Historically, asthma mortality has been higher in blacks than in whites (Figure 5).

WHAT CAN YOU DO?

We do not fully understand how to prevent the development of asthma, but asthma can be controlled with the combination of proper preventive health care and control of exposure to allergens and irritants. However, some research shows that eliminating exposure to indoor air pollutants, particularly for children and pregnant mothers, may prevent a person from developing asthma. If you are already living with asthma, you should know about the effective methods for treating your asthma and preventing attacks that include the following:

- Visit your physician for ongoing assessment and monitoring of your asthma and to develop an asthma action plan.
- Use prescribed medications correctly, and carefully follow your asthma action plan
- Avoid asthma triggers at school, work, home, outdoors, and elsewhere. Triggers for asthma can include mold, tobacco smoke, outdoor air pollution, and infections linked to influenza, colds, and other viruses.
- Check your local Air Quality Index, and take steps to reduce your exposure to air pollutants when levels are high by reducing the amount of time spent outside or involved in heavy physical activity (<http://airnow.gov>).

ADDITIONAL RESOURCES

Many resources offer information on asthma and are readily available on the internet. Following are several sites that may be helpful to you:

- Asthma: Basic Information at <http://www.cdc.gov/asthma/faqs.htm>.
- CDC Asthma Web page at <http://www.cdc.gov/asthma>.
- The National Heart, Lung, and Blood Institute’s “Asthma” Web page at http://www.nhlbi.nih.gov/health/dci/Diseases/Asthma/Asthma_WhatIs.html.
- The Environmental Protection Agency (EPA) Web site on asthma at <http://www.epa.gov/asthma/>



REFERENCES

1. CDC. Asthma. Helping Americans with asthma [online]. 2013. [cited 2013 Jul 24] Available from URL: http://www.cdc.gov/asthma/helping_people.htm.
2. Institute of Medicine. Clearing the air—asthma and indoor air exposures [online]. Washington, DC: National Academy Press; 2000. [cited 2011 Sep 1]. Available from URL: http://books.nap.edu/openbook.php?record_id=9610.
3. Brunekreef B, Holgate ST. Air pollution and health. *Lancet* 2002;360(9341):1233–42. Ostro B, Lipsett M, Mann J, Braxton-Owens H, White M. Air pollution and exacerbation of asthma in African-American children in Los Angeles. *Epidemiology* 2001;12(2):200–8.
4. Ostro B, Lipsett M, Mann J, Braxton-Owens H, White M. Air pollution and exacerbation of asthma in African-American children in Los Angeles. *Epidemiology* 2001;12(2):200–8.
5. Mortimer KM, Neas LM, Dockery DW, Redline S, Tager IB. The effect of air pollution on inner-city children with asthma. *Eur Respir J* 2002;19(4):699–705.
6. CDC. Asthma: Data and Surveillance. Tables and Graphs. 2011 National Health Interview Survey (NHIS) data, Table 3-1[online]. 2013. [cited 2013 Nov 8]. Available from URL: <http://www.cdc.gov/asthma/nhis/2011/table3-1.htm>
7. Barnett SBL, Nurmagambetov TA. Costs of asthma in the United States: 2002–2007. *J Allergy Clin Immunol*. 2011;127(1):145–152.
8. CDC. Asthma: Data and Surveillance. Tables and Graphs. 2011 National Health Interview Survey (NHIS) data, Table 1-4[online]. 2013. [cited 2013 Nov 8]. Available from URL: <http://www.cdc.gov/asthma/nhis/2011/table4-1.htm>.
9. Akinbami LJ, Moorman JE, Liu Xiang. Asthma prevalence, health care use, and mortality: United States, 2005–2009. *Natl Health Stat Report*, no. 32 [online] Hyattsville, MD: National Center for Health Statistics. 2011 Jan. [cited 2012 Sep 26]. Available from URL: <http://www.cdc.gov/nchs/data/nhsr/nhsr032.pdf>.
10. Gern JE, Busse WW. Relationship of viral infections to wheezing illnesses and asthma. *Nat Rev Immunol* 2002;2(2):132–8. Review.
11. Garn H, Renz H. Epidemiological and immunological evidence for the hygiene hypothesis. *Immunobiology* 2007;212(6):441–452.
12. Strachan DP. Hay fever, hygiene, and household size. *BMJ* 1989;299(6710):1259–60.
13. Eagan TM, Bakke PS, Eide GE, Gulsvik A. Incidence of asthma and respiratory symptoms by sex, age and smoking in a community study. *Eur Respir J* 2002;19(4):599–605.
14. US Department of Health and Human Services. The health consequences of involuntary exposure to tobacco smoke: a report of the Surgeon General [online]. 2006. [cited 2011 Sep 2]. Available from URL: <http://www.surgeongeneral.gov/library/secondhandsmoke/report/fullreport.pdf>.
15. Dixon AE, Holguin F, Sood A, et al. An official American Thoracic Society workshop report: obesity and asthma. *Proc Am Thorac Soc* 2010;7(5):325–35.
16. Romieu I, Avenel V, Leynaert B, Kauffmann F, Clavel-Chapelon F. Body mass index change in body silhouette, and risk of asthma in the E3N cohort study. *Am J Epidemiol* 2003;158(2):165–74.
17. CDC. Asthma prevalence, health care use and mortality: United States, 2005–09 [online]. 2011 Jan. [cited on 2011 Sep 1]. Available from URL: <http://www.cdc.gov/nchs/data/nhsr/nhsr032.pdf>.
18. CDC. Asthma. Data and Surveillance, National Health Interview Survey (NHIS) data, 2001–2011 [online]. 2011 Apr. [cited 2011 Sep 2]. Available from URL: <http://www.cdc.gov/asthma/nhis/default.htm>.
19. CDC. Behavioral Risk Factor Surveillance System (BFRSS). Prevalence and trends data, asthma–2010: Adults who have been told they currently have asthma [online]. 2011 June 8. [cited 2011 Sep 2]. Available from URL: <http://apps.nccd.cdc.gov/gisbrfss/map.aspx>.
20. Moorman JE, Akinbami LJ, Bailey CM, et al. National Surveillance of Asthma: United States, 2001–2010. *National Center for Health Statistics. Vital Health Stat* 3(35). 2012. [cited 2013 Oct 24]. Available from URL: http://www.cdc.gov/nchs/data/series/sr_03/sr03_035.pdf.
21. Moorman JE, Rudd RA, Johnson CA, King M, Minor P, Bailey C, et al. National Surveillance for Asthma, United States, 1980–2004. *MMWR Surveill Summ* 2007; 56(SS–8):1–54. Available from URL: <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5608a.htm>.
22. DeFrances CJ, Hall MJ. 2005 National Hospital Discharge Survey. *Adv Data* 385[online]. Hyattsville, MD: National Center for Health Statistics. 2007. [cited 2011 Sep 2]. Available from URL: <http://www.cdc.gov/nchs/data/ad/ad385.pdf>.
23. DeFrances CJ, Lucas CA, Buie VC, Golosinskiy A. 2006 National Hospital Discharge Survey. *Natl Health Stat Report* 5[online]. Hyattsville, MD: National Center for Health Statistics. 2008. [cited 2011 Sep 2]. Available from URL: <http://www.cdc.gov/nchs/data/nhsr/nhsr005.pdf>.
24. Hall MJ, DeFrances CJ, Williams SN, Golosinskiy A, Schwartzman A. National Hospital Discharge Survey: 2007 summary. *Natl Health Stat Report* 29 [online]. Hyattsville, MD: National Center for Health Statistics. 2010. [cited 2011 Sep 2]. Available from URL: <http://www.cdc.gov/nchs/data/nhsr/nhsr029.pdf>.